C L A I M S:

1. A process for the isolation and purification of nucleic acids, in particular, plasmid or genomic DNA from cells or other sources, wherein

a) the cells containing nucleic acids are digested and cell debris is removed, or other samples containing nucleic acids are treated with anion exchangers, namely, in buffer solutions of low ionic strength,

b) thereafter, the nucleic acids are desorbed from the anion exchanger using a buffer of high ionic strength, in order to be subsequently

c) treated in said buffer of high ionic strength or in the presence of lower alcohols and/or poly(ethylene glycol) with a mineral support material, with adsorption of the nucleic acid to the surface of the mineral support materials, whereupon

d) desorption of ~~the~~ nucleic acid is effected using water or a buffer solution of low ionic strength.

2. The process according to claim 1, characterized in that the process steps b) and c) are carried out in immediate succession.

3. The process according to claim 1 ~~and/or 2,~~ wherein centrifugation or filtration steps are effect-

ed upstream from step a) in order to remove undissolved components mechanically.

4. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 3,~~ wherein between the steps a) and b) one or more washing steps are effected using a buffer solution of low ionic strength or increasing ionic strength per washing step.

5. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 4,~~ wherein between the steps c) and d) one or more washing steps are effected using a buffer solution of high ionic strength.

6. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 5,~~ wherein between the steps c) and d) at least one washing step is effected using a aqueous/alcoholic solution.

7. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 6,~~ wherein between the steps c) and d) of claim 1 a washing step is effected using a somewhat higher ionic strength corresponding to a 1.5 molar sodium perchlorate solution and a relatively low pH value such as 5.

8. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 7,~~ wherein an anion exchanger is used, preferably having high surface charge.

9. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 8,~~ wherein the nucleic acid is derived from a PCR (polymerase chain reaction), SSSR (self-sustained sequence replication), and ligase chain reaction.

10. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 9,~~ wherein the nucleic acid comprises from 10 nucleotides to 200,000 nucleotides.

11. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 10,~~ wherein the nucleic acids are derived from bacteria, cell cultures, blood, tissue, urine, viruses, or other biological sources.

12. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 11,~~ wherein labeled nucleic acids, more specifically, biotin-labeled nucleic acids, fluorescence-~~labeled~~ nucleic acids such as fluorescein isothiocyanate-labeled or radioactively labeled nucleic acids are employed.

13. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 12,~~ wherein as the mineral supports, there are used silica gel, glass, zeolites, aluminum oxide, titanium dioxide, zirconium dioxide, kaolin, and/or diatomacae are employed.

14. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 13,~~ wherein porous or non-porous matrices having a particle size of from 1 to 250 μm, preferably from 10 to 30 μm, are used.

15. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 14,~~ wherein a silica gel suspension having a particle size of from 1 to 250 μm, preferably from 1 to 5 μm, is used.

16. The process according to ~~at least one of~~ claim~~s~~ 1 ~~to 15,~~ wherein the anion exchanger has a particle size of from 1 to 250 μm, preferably from 10 to 100 μm, and a pore diameter of from 1 to 2,500 nm, preferably from 100 to 400 nm.

17. A device for the isolation and purification of nucleic acids, having a hollow body (1) with an inlet opening (7) and an outlet opening (8), wherein in the hollow body (1), between two securing means (5, 6), a powdered first material based on silica gel (10) is arranged, characterized in that a second material (11) is placed between the first material 10 and the outlet opening (8), the first and second materials (10, 11) having different adsorption characteristics for nucleic acids.

18. The device according to claim 17, characterized in that the securing means (5, 6) are porous panes of ~~sintered glass or~~ ceramics (frits) or membranes of plastics such as polyethylene, polypropylene, polytetrafluoroethylene, or Nylon.

19. The device according to claim 17 ~~and/or 18~~, characterized in that the materials (10, 11) are directly adjacent to each other, namely, in separate layers and together are held by the securing means (5, 6).

20. The device according to ~~at least one of~~ claims 17 ~~to 19~~, characterized in that the materials (10, 11) are separated by separating means (13).

21. The device according to claim 20, characterized in that the separating means (13) is a porous pane of sintered glass (frit) or a plastic membrane, preferably made of Nylon.

22. The device according to ~~at least one of~~ claims 17 ~~to 21~~, characterized in that the second material (11) is secured in the outlet tube (18) forming a channel and having a smaller cross-section than the hollow body (1), between the securing means (5, 15).

23. The device according to claim 22, wherein the second material (11) is separated from the first material (10) merely by a common means (17).

24. The device according to ~~at least one of~~ claims 17 ~~to 23,~~ characterized in that the first material (10) consists of an anion exchanger based on silica gel, while the second material (11) consists of a silica glass.

25. The device according to ~~at least one of~~ claims 17 ~~to 24,~~ characterized in that the materials (10, 11) are in the form of powder and/or are molded bodies.

26. The device according to ~~at least one of~~ claims 17 ~~to 24,~~ wherein the particles of the materials (10, 11) are embedded in a support net of inert plastics.

27. The device according to claim 26, characterized in that the support net consists of Teflon.

28. The device according to ~~at least one of~~ claims 17 ~~24 to 27,~~ characterized in that in the hollow body (1), between inlet (7) and the first material (10), there is arranged a further layer (12) which acts as a mechanical filter means.

29. The device according to claim 28, characterized in that the third layer (12) is an asymmetric filter, with the filter pore size decreasing in flow direction.

30. The device according to ~~one of~~ claims 28 ~~and/or 29~~, wherein the asymmetric filter consists of sintered glass having decreasing pore size or stacked plastic membranes having decreasing pore size.

31. Use of the device according to ~~at least one of~~ claims 17 ~~to 30~~ in a process according to ~~at least one of~~ claims 1 ~~to 15~~ for protein removal from a sample containing nucleic acids, avoiding phenolic, phenol/chloroform or chloroform extraction.

32. Use of a washing or adsorption buffer for operating the process according to ~~at least one of~~ claims 1 ~~to 16,~~ characterized in that the solution contains from 1 to 7 M sodium perchlorate, from 1 to 7 M guanidine-HCl, from 1 to 5 M sodium chloride, from 1 to 6 M sodium iodide, 1 M sodium chloride/20% ethanol or lower alcohols such as propanol, isopropanol, butanol and/or poly(ethylene glycol).

33. Use of a buffer system for elution of the adsorbed nucleic acids in a process according to at least one of claims 1 to 16, wherein the buffer contains water and Tris at a pH value of from 5 to 9.

34. Use of the nucleic acids recovered in a process according to ~~at least one of~~ claims 1 ~~to 16~~ in one of the following enzymatic reactions, such as restriction, sequencing, amplification, or labeling.

35. A process for the isolation and purification of nucleic ~~acids~~ from cells or other sources, wherein

a) cell debris or other particles are removed by a filter layer with decreasing pore size in flow direction,

b) the effluent then being treated with an anion exchanger in buffer solutions of low ionic strength.

36. A device for operating the process according to claim 35, wherein at least one filter layer (12, 20, 21, or 22) is arranged within the lumen of a substantially cylindrical hollow body (1) upstream of a layer (10) secured between two means (5, 6), as viewed from the direction of the inlet opening (7), which has anion exchanging properties.

37. A process for the isolation and purification of nucleic acids from cells or other sources, wherein

a) cell debris or other particles are removed by a filter layer with decreasing filter pore size as viewed in flow direction of the samples, wherein

b) subsequently, the effluent is treated with a mineral support in buffer solutions of high ionic strength.

38. A device for operating the process according to claim 37, wherein at least one filter layer (12, 20, 21, or 22) is arranged within the lumen of a substantially cylindrical hollow body (1) upstream of a layer (11) secured between two means (5, 6), as viewed from the direction of the inlet opening (7), which is capable of binding nucleic acids at a high ionic strength of the respective solution.

add C1

add B1

add J7

add J5

add H7

add J1